Varela uses the term *autonomy* for systems that define and maintain their own boundaries. Ruiz-Mirazo, Peretó, and Moreno provide a useful characterization of an autonomous system as

> a far-from-equilibrium system that constitutes and maintains itself establishing an organizational identity of its own, a functionally integrated (homeostatic and active) unit based on a set of endergonic-exergonic couplings between internal self-constructing processes, as well as with other processes of interaction with its environment. (2004, p. 330)

Autonomy in this sense is a feature of any living system. Although each mechanism does not have to be autonomous, it must be part of a system that is.

The requirement of being built up through self-organizing processes also provides a means to address a key feature of Bichat's critique of mechanism with which I began this section. Bichat contended that living systems resist death. In fact, this generally takes the form of adaptive change over time so as to deal with novel environments. Understanding the adaptive capacities of biological organisms is challenging. Developmental theorizing, in both biology and psychology, has been driven by the polar positions of nature and nurture. Advocates of a nurture position maintain that the organization was not substantially prespecified, but rather resulted from interactions with the environment. But advocates of the nurture position have faced apparently insurmountable obstacles. The end-product of both biological and psychological development is a highly structured state. Ensuring the achievement of such structure seems extremely problematic if everything must be directed from the environment. The nature position seems improbable in its own right, requiring a vast amount and efficacy of innate information.

Within the sphere of cognitive development, the psychologist Jean Piaget proposed an alternative to the polarizing options of nature and nurture – a position he referred to as *constructivism*. He introduced this alternative as follows: "The essential functions of the mind consist in understanding and in inventing, in other words, in *building up structures* by structuring reality" (Piaget, 1971, p. 27). Piaget's attempt to find a middle path between nature and nurture, however, turned out to be bitterly contested. The philosopher of psychology Jerry Fodor objected, "It is *never* possible to learn a richer logic on the basis of a weaker logic, if what you mean by learning is hypothesis formation and confirmation" (1980, p. 148). Fodor's idea was that before one can test a hypothesis one must be able to formulate it, and that entails the capacity to represent it. Thus, the capacity to represent any hypotheses that one will ever test must be innate, making the native endowment very